Tripoli University **Electrical and Electronic Engineering**
EE334 **First Exam.** **Time: 90**

Q_1) 1. List the following 8086 registers:

1.5 The four 16-bit general registers: AX , BX , CX ,DX - The two index registers: SI , DI
The three pointer registers: SP ,BP, IP The four segment registers: CS,DS,SS,ES

2. a)Which segment contains the executable machine code? CODE SEGMENT
b) Variables are stored in what segment? DATA SEGMENT
2.5 c) Which register points to the offset address of the next instruction? Instruction pointer register (IP)
d)Which bit in the status register is set if the result of an instruction is zero? ZERO FLAG BIT (ZF)
e)Which bit in the status register is set if the result of an instruction is negative? SIGN FLAG BIT (SF)
f)Which register contains the offset address of the top of the stack? STACK POINTER (SP)

2 3. What Assembly Language? is a low-level programming language for a computer, microcontroller, or other programmable device, in which each statement corresponds to a single machine code instruction.

2 4. What is Machine Language ? Machine code or machine language is the name for commands. They can directly be executed by a processor. Usually, they are 1s and 0s.

5. Define Register Relative Addressing Mode? Register Relative Addressing Mode **:** The Effective Address is Calculated by the sum of 8- or 16 bit displacement and the contents of a base Register or an index Register. E.A. = content of(BX or BP or SI or DI) + (8 bit displacement (sign extended) or 16 bit displacement Physical Address = E.A +(DS)*16_{10} 3

3 6. List the functions of Bus Interface Unit in 8086? * Sends out addresses * Fetches instructions from memory * Reads data from ports and memory * Writes data to port and memory

7. When the Overflow flag is set ? For addition of 16 bits, this flag is set when there is a carry into the MSB and no carry out of the MSB. 3

8. Write about the following instruction : MOV CS:[BX], DL ? It copies a byte from DL Register. Effective Address for the memory location is contained in the BX Register. Normally an effective address in BX will be added to the data segment base in DS to produce the physical memory address. In this instruction CS: indicates that we want the BIU to add the effective address to the code segment base in CS to produce the physical address. content of (BX+(CS) * 16_{10}) = (DL) 3

9. Write the difference between CBW and CWD instruction in 8086?
2 CBW : Convert a byte to a word, sign extend AL Register into a AH Register.
CWD : Convert a word to a double word ,sign extend the AX Register into the DX Register

10. Write about the following instruction: LEA CX, [3483H]? LEA instruction return the offset address of the source and store it at the destination . so this instruction will copy the address of the source which is the address of [3483] memory location to CX . in order the address is 3483 . CX= 3483. 3

1 Q_2 .1) After the statements : MOV AL,94H
NOT AL
are executed, the hex value in register *AL* will be 6BH

1 2.After the statements :MOV BL,7BH
ROR BL,1
are executed, the hex value in register *BL* will be BDh

2 3. After the statements: STC ;set carry flag
MOV DL,0A6H
RCL DL,1
are executed, the hex value in register *DL* ,CF ,and OF will be 4Dh ,, CF=1 ,OF= 1

2 4. After the statements: MOV CL,4
MOV AL,0C3H
SAR AL,CL
are executed, the hex value in register *AL* will be FCh , CF=0 , OF=0

5. After the statements : mov AX,1234h

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```
mov   AX,100h
Mul   BX
```

are executed, the hex value in register *AX, DX,BX ,CF(why)* will be: DX-AX = ***0012***3400 ,, BX = 100h , CF=1 - the Carry flag is'1' because the upper half of the result (DX) is not zero

6. After the statements : MOV AX , 8760h

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```
MOV   BX , 100h
IMUL  BX
```

are executed, the hex value in register *AX, DX,BX ,CF(why)* , and OF (why) will be :

DX = FF87h, AX = 6000h, OF = 1 ,CF=1 , CF and OF== 1 because DX is not a sign extension of AX, so the Carry/ Overflow flag is set.

7. . After the statements: MOV AL, 11100000b

2

```
SHL   AL, 1
```

are executed, the hex value in register *AL,CF* , and OF (why) will be : C0h , CF=1 , OF=0 , Overflow was cleared because the MSb of the result same as carry flag bit.

8. - After the statements: STC

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```
MOV AX , 1FA9  ; CF =1, AX =00011111 10101001
   MOV CL, 2
  RCL AX, CL        ; CF =0, OF=0
```

are executed, the hex value in register *AX,CF* , and OF (why) will be : AX= 7EA6h , CF= 0 , OF=0 , OF=0 because the MSb does not changed.

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9. After the statements: **CMP Op1 ,Op2**

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are executed, the value in register *CF ,* ZF, SF and OF , what does it mean if it equal :

Flag bit value	Unsigned operand	Signed operand	Note
CF =1	Op1 < Op2	no meaning	
CF =0	Op1 >= Op2	no meaning	
ZF= 1	Op1 = Op2	Op1 = Op2	
ZF=0	Op1 ≠ Op2	Op1 ≠ Op2	
SF=1	no meaning	Op1 < Op2	If OF=0
SF=0	no meaning	Op1 < Op2	If OF=1
OF=1	no meaning	Op1 >= Op2	If SF=1
OF=0	no meaning	Op1 >= Op2	If SF=0

Q 3) 1. Write about the following instruction : Call WORD PTR [BX]

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This a Near call instruction because the jumping address 2byte (16 bit) ,Offset of the first instruction of procedure is in two memory addresses in DS. It replaces the contents of IP with contents of word memory locations in DS pointed to by BX.

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2. a: Write an ALP Program in 8086 to add the 'N' elements of an array ,and store the result in AX.

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b: Write an ALP program in 8086 to find the biggest number of given elements.

```
.model small
.data
   array db ?,?,?,?,?,.........?
 .code
 Start:
       mov Ax , @data
       mov DS, AX
       mov BX , offset array
       mov CX, N
```

```
          mov    AL    ,[BX]
          mov    AH     ,00h
Again :
          INC BX
          ADD AX ,[BX]
          LOOP Again
;.........................
          mov CX, N
          mov DX, [BX]
```

```
above :  DEC BX
          CMP   DX   , [BX]
          JA  next
          Mov DX ,[BX]
  next :
          loop  above
          RET
          END Start
```

Q_4 Write a subroutine that will convert all lower case characters in a string to upper case. A lower case ASCII character has a value between 61H ('a') and 7Ah ('z'). To convert to lower case, subtract 20H or clear bit B5 to a zero. The starting string address is passed in register BX , and the string is NULL TERMINATED (last byte is 00h). Other characters in the string that are not lower case characters ';';should be unaffected.

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```
  .model small
   .code
   Start:
         mov Ax , @data
         mov DS, AX

           DEC BX
again :
           INC    BX
           MOV   AL    , [BX]
           CMP    AL   ,  00H
           JZ        finish
           CMP    AL    ,  61H
           JB       again
           CMP    AL    , 7AH
           JA      again
          SUB     AL      , 20H    ; or  AND AL , 11011111b
          MOV    [BX]   ,  AL
          JMP     again
 Finish :
          RET
         END  start
```

************************************** GOOD LUCK **************************************